

MINNESOTA PIPELINE PROJECT

PRIVATE INVESTMENT, PUBLIC EDUCATION

LABOR AND INDUSTRY EXPERIENCE

ADVANCED MANUFACTURING OCCUPATIONS

Flexo Technician -

A Flexographic Press Operator (technician) is a skilled position responsible for the printing of flexographic materials. Set up, adjust, operate and maintain narrow web flexographic labels or films which include large solids, screen tints, line and halftones with critical color values and registration requirements ranging from standard to critical. Review job specifications to determine the press setup according to the approved customer proof. Perform all make-ready tasks associated flexographic presses such as mounting plates, installing print cylinders, installing/adjusting dies, monitoring and adjusting inks, adjusting tension and register etc. Makes necessary color corrections and/or press adjustments prior to production run to meet and maintain the quality specifications of the work to match proofs for both color and content. Responsible to complete all paperwork and quality checks. Clean, lubricate, and maintain the press, making minor repairs and replacing worn or broken parts as required. Performs periodic maintenance recommended by the manufacturer. Following all safety rules and regulations and maintaining work area in neat and orderly condition are also a must.

Industry-Sector Technical Competencies

- Press components – (Doctor Blades, anilox rolls, gears and tooling, Dies) – Understand the purpose importance and proper maintenance and safety print components.
- Flexographic Print Components (inks, substrates) – Understand the various ink systems and proper maintenance for Water, UV/LED and Solvent based ink as well as the substrate they are printed on.
- Color Theory – understand basic color theory and its impact on the perception of color.
- Color Measurement – understand density, dot gain, Lab* color space and the proper use of a spectrodensotometer for measuring them.
- Die Cutting – Understand the fundamentals of precision die cutting, including how they cut, tooling specifications, maintenance and safety.
- Printing Math and measurement – Training in basic math including linear measurement and print related math, including converting counts to feet, calculating total footage based on repeats and quantity requires.
- Press Configurations – Learn the different flexographic press configurations, component arrangements and the markets that they serve.
- Print Terminology – Understand common print terminology and how it related to the flexographic printing industry.
- Safety and Environmental Concerns – Knowledge in proper safety for equipment and manufacturing facilities and environmental concerns for the flexographic industry.

- Paperwork /QC sign offs – Know the proper methods and instruments used to effectively inspect final printed products.
- Troubleshooting and problem solving – Training on common problems and solutions as well as training on trouble shooting guidelines and processes.
- Equipment maintenance and lubrication – Practice industry approved procedures for preventative maintenance and lubrication on machines and tools
- Spec reading/print reading – Knowledge in reading and understanding print specs.

Occupation Specific Competencies

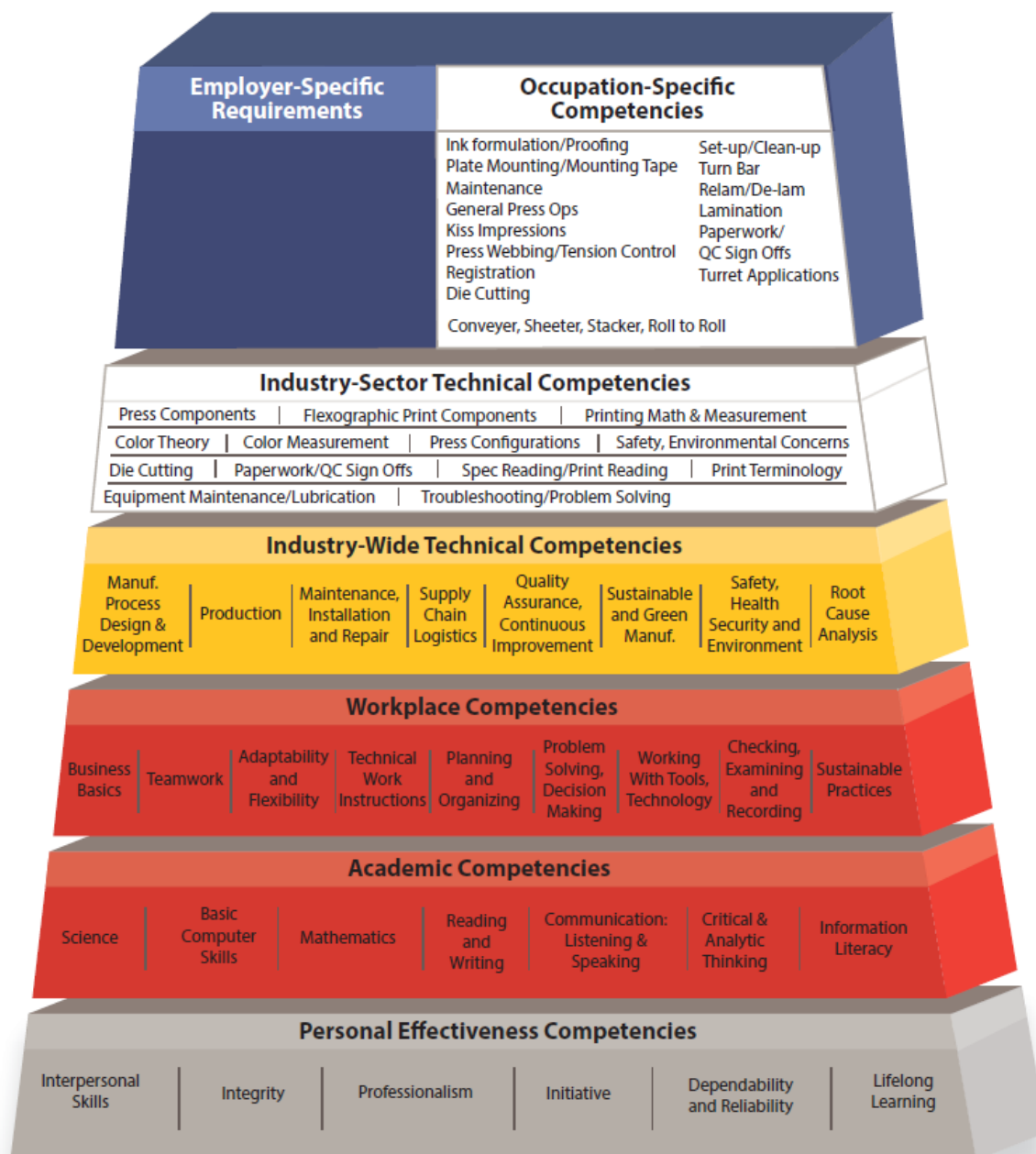
- Ink Formulation and Proofing – Demonstrate Basic ink formulation to match drawdowns to sample with a Delta E of 2.5 or less. Training in proper procedures, formulation math, color measurement ink adjustment and proper use of the drawdown tool.
- Plate Mounting & Mounting tape – Demonstrate accurate flexographic plate mounting for a specific unwind direction and understand the fundamentals of the various mounting tapes and the type of print they would be used for.
- Maintenance – Demonstrate basic press maintenance, with basic cleaning and maintenance procedures.
- General Press Operations – Demonstrate proper press operations to productively set up and run simple Line work, complex Line Work, 4 Color process, 2 Over 4, front and back, 8 color work, and multiple die sets.
- Press Webbing and Tension Control – Demonstrate proper web handling and tension techniques including the proper use of the unwind tension, infeed nip, pacing tension and outfeed pacing tension as well as other various tension application for inline converting.
- Kiss Impressions – Able to perform the ability to properly and productively set kiss impressions on a narrow web press.
- Registration – Demonstrate the ability to register multiple colors to each other as well as dies.
- Die cutting – Demonstrate proper installation maintenance and safety of a rotary or magnetic die and exhibit a clear understanding of how a die cuts and the importance of a die stain test.
- Set up and clean up procedure – Demonstrate safe, proper and productive procedures for repeatable setting up and clean up a flexographic press.
- Conveyer, Sheeter, Stacker, Roll to roll – Demonstrate the ability to install set up and properly stack product using a conveyer, sheeter or stacker. Finish products can also be roll to roll.
- Turn bar – Demonstrate the ability to install web register and print on both sides of the web.
- Relam/De-lam – Demonstrate the ability to properly set up, register print, and maintain tension, while de-laminating then re-laminating a substrate.
- Lamination – Demonstrate the ability to properly install web and set tensions using laminate

- Paperwork /QC sign offs – demonstrate and understating of Quality control as they relate to the manufacturing environment.
- Turret applications – Demonstrate the proper procedures for setting up, webbing and running a turret rewinder.

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Competency Model for Advanced Manufacturing

Occupation: Flexo Technician



Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

Flexo Technician Occupational Competency Training Plan

Related Instruction means an organized and systematic form of instruction designed to provide the apprentice with the knowledge of the theoretical and technical subjects related to the apprentice's trade of occupation, or industrial courses or, when of equivalent value, by correspondence, electronic media, or other forms or self-study approved by the commissioner.

	Course	Course Description	Credit/Non-Credit	Hours Spent on Competency
Press Components				
Flexographic Print Components				
Printing Math & Measurement				
Color Theory				
Color Measurement				
Press Configurations				
Food Security/Bio Security				
Safety, Environmental Concerns				
Die Cutting				
Paperwork/QC Sign Offs				
Spec Reading/Print Reading				
Print Terminology				
Equipment Maintenance/Lubrication				
Troubleshooting/Problem Solving				

On-The-Job Training is the work experience and instruction. Training experience need not be in the exact order as listed below.

	Trainer/Instructor	Name of person responsible for verifying competency mastery	Hours spent on competency
Ink Formulation/Proofing			
Plate Mounting/Mounting Tape			
Maintenance			
General Press Ops			
Kiss Impressions			
Press Webbing/Tension Control			
Registration			
Die Cutting			
Set-Up/Clean-Up			
Turn Bar			
Relam/De-lam			
Lamination			
Paperwork/QC Sign Offs			
Turret Applications			
Conveyer, Sheeter, Stacker, Roll to Roll			

MINNESOTA PIPELINE PROJECT

PRIVATE INVESTMENT, PUBLIC EDUCATION

LABOR AND INDUSTRY EXPERIENCE

Machinist/CNC Operator -

A machinist/CNC Operator oversees the CNC machines that shape parts from metal or plastic. They must interpret blueprints, manuals and other work instructions. They also study sample parts to determine dimensions of finished work pieces and equipment setup requirements. They set the machine and load it with the correct cutting tools. Machinists inspect work pieces throughout a production run. In addition, machinists measure and mark dimensions and reference points on material or work pieces as a guide for subsequent machining. Machinists additionally clean and perform basic preventative maintenance functions on machines, tooling and parts. They must work safely to prevent on-the-job injuries, which includes wearing personal protective equipment such as safety glasses. They also inspect cutting tools for sharpness and usability. These professionals additionally detect malfunctions using precision measuring instruments such as micrometers, dial calipers, depth gages, indicators and scales.

Industry-Sector Technical Competencies

- Machining Introduction – Learn basic machining operations including safety, MSDS, measuring tools and use of drill presses and band saws.
- Blueprint Reading – Knowledge in reading and understanding industrial prints.
- Shop Math and Measurement – Training in basic math including linear measurement, metrics and beginning algebra.
- CNC Turning – Training in how to operate a lathe including types of chucks, cutting tools, speeds and feeds, tool care, threads, part production and general inspection.
- CNC Milling – Learn mill operation including clamping, tools and holders, speeds and feeds, cutting depths/width along with direction.
- CNC Setup and Programming Basics – Exposure to manual programming of Computer Numerical Control (CNC) machine tools. Learn types of CNC controls, machinery, programming formats and basic terminology.
- Machine Tool Theory – Learn to complete the processes required for manufacturing a precision part, use standard shop safety practices, set-up and operate standard manufacturing machines, complete accurate lay-outs, explain applications of hand tools and use correctly and use basic measuring tools.
- Molding – Understand the fundamentals of injection molding technology.
- Metallurgy – Know the basic principles of metals, the behavior of metals and the processes which affect them, as well as the most common metals used in industrial processes.
- Inspection – Know the proper methods and instruments used to effectively inspect parts in the shop, including using instruments such as the caliper, micrometer, and CMM.

Occupation-Specific Competencies

- General Housekeeping and Maintenance – Demonstrate the ability to maintain tools and machinery with basic cleaning and maintenance procedures.
- Preventative Maintenance -Machine Tools Maintenance – Practice industry approved procedures for preventative maintenance on machines and tools.
- Benchwork and Hand Tools – Knowledge of the various tools, methods, and procedures for common machine shop benchwork and hand tool work.

Level 1 Machinist

- Manual Milling – Display basic operation of the vertical and horizontal milling machines and the ability to use cutting tools and holders, setups, spindles and arbors, work holding methods.
- Turning Operations – Demonstrate lathe applications such as understanding turning safety, calculating speeds and feeds, using various tools and tool holders, identifying basic tool geometry, and the use of common lathe spindle tooling.
- Grinding Skills – Use surface grinders with proper set up techniques and grinding processes.
- CNC Turning – Demonstrate CNC lathe operations, control functions, the letter address system, the program format, and machine setup.
- CNC Milling – Demonstrates the fundamentals of CNC machining processes with skills in work holding, speeds and feeds for various materials and functions and capabilities of CNC machining tools.
- Inspection Practices – Demonstrate the proper methods and instruments used to effectively inspect parts in the shop, including using instruments such as the caliper, micrometer, and CMM.

Level 2 Machinist

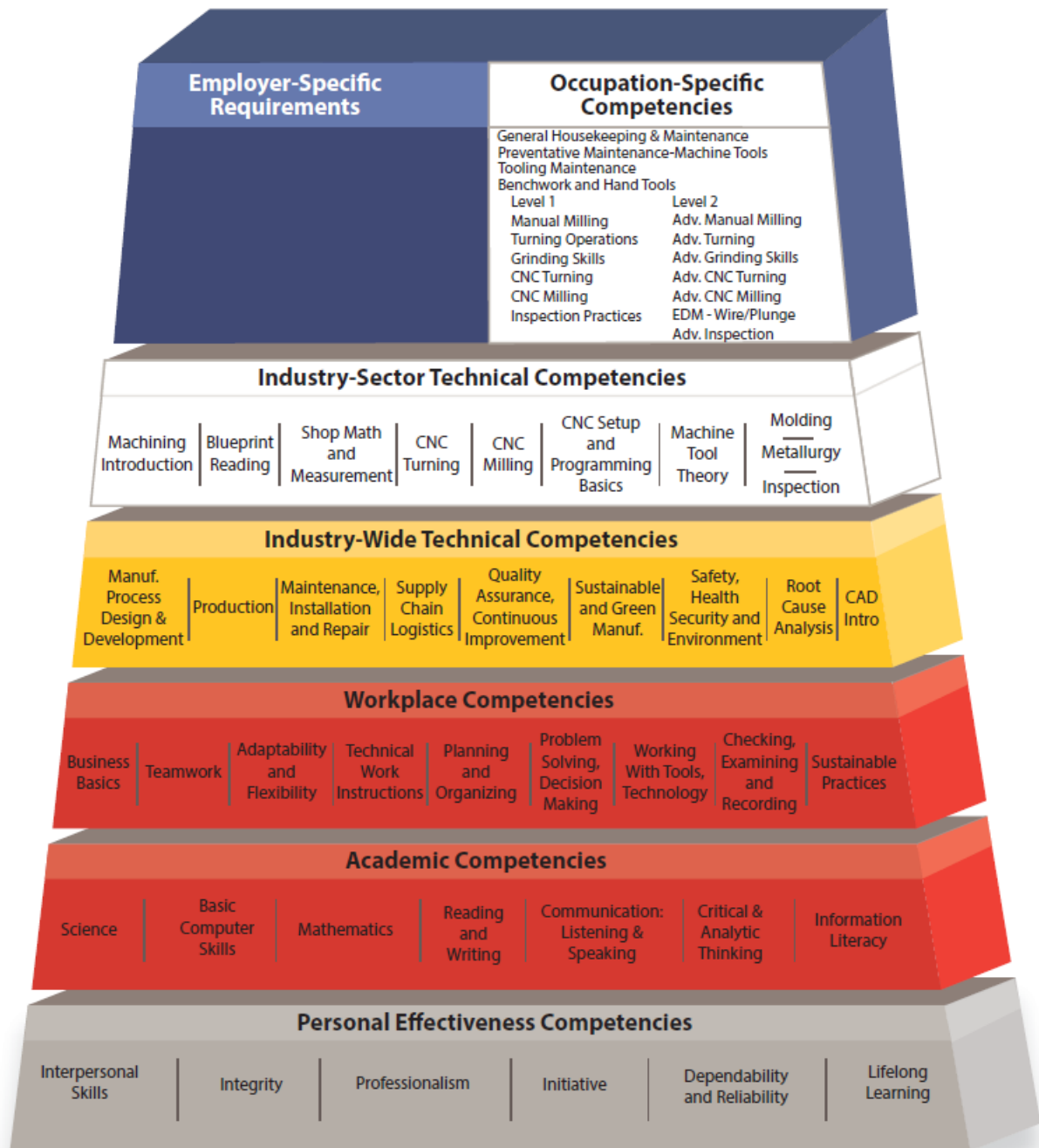
- Advanced Manual Milling –Use mill for advanced techniques such as squaring a block, perform angle layouts with various methods including a sign bar. Perform simple keyseat and slotting operations.
- Advanced Turning – Ability to operate lathe for advanced processes such as form radius, single-point isometric threads, turn spherical radius, use a radius gauge, as well as advanced taper techniques and work support devices.
- Advanced Grinding Skills – Demonstrate advanced techniques of grinding including use of sine bars and chucks, sine bars, gage blocks, wheel balancers, various grinding wheels and diamond dressers.
- Advanced CNC Turning – Able to perform advanced techniques of CNC lathe including turning with an offset talkstock and boring functions.
- Advanced CNC Milling – Use advanced techniques of setting-up and operating CNC milling machines including principles of clamping and locating work piece, selection of cutting tools and holders along with use of rotary tables. Demonstrate pocketing slotting and keyseat techniques as well as edging techniques.

- EDM – Wire/Plunge – Prepare, operate, and maintain the wire EDM machine. Create basic G-code without the use of CAM software.
- Advanced Inspection – Able to use measuring instruments relating to state-of-the-art manufacturing environments, such as coordinate measuring machine and calibration. Understanding of Quality Control, TQM, and SPC processes as they relate to manufacturing environments.

PIPELINE Project

Competency Model for Advanced Manufacturing

Occupation: Machinist/CNC Operator



Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

Machinist/CNC Operator Occupational Competency Training Plan

Related Instruction means an organized and systematic form of instruction designed to provide the apprentice with the knowledge of the theoretical and technical subjects related to the apprentice's trade of occupation, or industrial courses or, when of equivalent value, by correspondence, electronic media, or other forms or self-study approved by the commissioner.

	Course	Course Description	Credit/Non-Credit	Hours Spent on Competency
Machining Introduction				
Blueprint Reading				
Shop Math and Measurement				
CNC Turning				
CNC Milling				
CNC Setup and Programming Basics				
Machine Tool Theory				
Molding				
Metallurgy				
Inspection				

On-The-Job Training is the work experience and instruction. Training experience need not be in the exact order as listed below.

	Trainer/Instructor	Name of person responsible for verifying competency mastery	Hours spent on competency
General Housekeeping & Maintenance			
Preventative Maintenance – Machine Tools			

Tooling Maintenance			
Benchwork and Hand Tools			
Level 1			
Manual Milling			
Turning Operations			
Grinding Skills			
CNC Turning			
CNC Milling			
Inspection Practices			
Level 2			
Advanced Manual Milling			
Advanced Turning			
Advanced Grinding Skills			
Advanced CNC Turning			
Advanced CNC Milling			
EDM – Wire/Plunge			
Advanced Inspection			

MINNESOTA PIPELINE PROJECT

PRIVATE INVESTMENT, PUBLIC EDUCATION

LABOR AND INDUSTRY EXPERIENCE

Maintenance and Repair Worker - Industrial machinery mechanics and maintenance workers maintain and repair factory equipment and other industrial machinery, such as conveying systems, production machinery, and packaging equipment.

Industry-Sector Technical Competencies

- Ergonomics – Knowledge of how to modify machines so operation is safe and productive for operator.
- Preventative maintenance – Training to anticipate and prevent potential malfunction of tools and machinery.
- Lubricants/lubrication systems – Understanding of why lubricants and lubricant systems are used and when it is most beneficial to use them.
- Troubleshooting and analysis – Training in troubleshooting issues with machinery using tools and knowledge of machinery.
- Robotics – Understand how to maintain and repair robotic devices.
- Inspection Criteria – Training in proper machine inspection.
- Motor Controls and PLCs – Understanding of how to program motor controls and PLCs and how to use them for interfacing, operation, and programming.
- Blueprint reading - Training on how to interpret blueprints and use those blueprints to build reliable and serviceable objects.
- Power systems – Instruction on how electrical, fluid, and pneumatic power systems function and how to maintain them.

Occupation-Specific Competencies

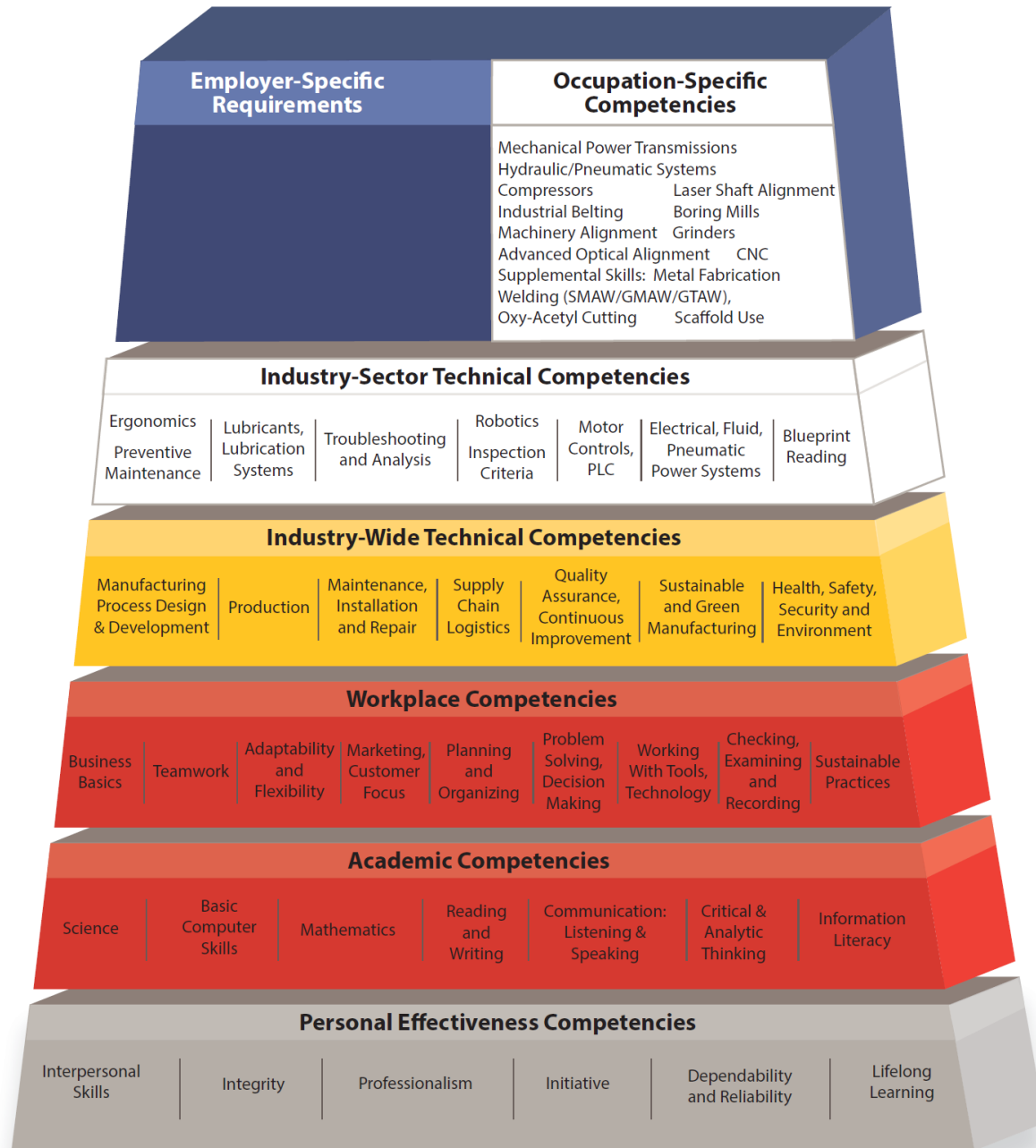
- Mechanical power transmissions – Demonstrate machine operation with power transmissions and how to maintain and repair them.
- Hydraulic/Pneumatic systems – Demonstrate function and operation of hydraulic and pneumatic systems and how to maintain and repair them.
- Machinery alignment – Ability to align machinery for proper operation.
- Optical Alignment – Ability to align advanced optical systems.
- CNC – Perform maintenance and repair on CNC machines.
- Compressors – Perform repair and maintain compressors.
- Laser Shaft Alignment – Demonstrate proper alignment principles and practices including troubleshooting.
- Industrial Belting – Maintain and repair industrial belting assembly systems.
- Boring Mills - Maintain and repair boring mills.
- Grinders – Perform grinding on parts as needed, as well as maintain grinding equipment.

Supplemental Skills – may be required depending on employer

- Welding - Exhibit knowledge of the safe operation of welding equipment and the welding skills needed to perform repair to machines.
- Metal Fabrication – As needed, perform metal fabrication.
- Oxy-Acetyl Cutting - As needed, perform oxy-acetyl cutting.
- Scaffold use - Demonstrate with how to safely ascend and perform job functions while using a scaffold.

PIPELINE Project

Competency Model for Advanced Manufacturing Occupation: Maintenance and Repair Worker



Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

Maintenance and Repair Worker Occupational Competency Training Plan

Related Instruction means an organized and systematic form of instruction designed to provide the apprentice with the knowledge of the theoretical and technical subjects related to the apprentice's trade of occupation, or industrial courses or, when of equivalent value, by correspondence, electronic media, or other forms or self-study approved by the commissioner.

	Course	Course Description	Credit/Non-Credit	Hours Spent on Competency
Ergonomics				
Preventative maintenance				
Lubricants/lubrication systems				
Troubleshooting and analysis				
Robotics				
Inspection Criteria				
Motor Controls and PLCs				
Blueprint reading				
Power systems				

On-The-Job Training is the work experience and instruction. Training experience need not be in the exact order as listed below.

	Trainer/Instructor	Name of person responsible for verifying competency mastery	Hours spent on competency
Mechanical power transmissions			
Hydraulic/Pneumatic systems			
Machinery alignment			
Optical Alignment			

CNC			
Compressors			
Laser Shaft Alignment			
Industrial Belting			
Boring Mills			
Grinders			
<i>Supplemental Skills</i>			
Welding			
Metal Fabrication			
Oxy-Acetyl Cutting			
Scaffold use			

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LABOR AND INDUSTRY EXPERIENCE

Mechatronics – Mechatronics Technicians require electrical, mechanical and computer skills necessary to work on complex systems found in manufacturing environments. The work includes basic electricity, fluid mechanics, mechanical drives, instrumentation, motor control and task specific to electrical, mechanical, and control specialties. The skills involved include industrial maintenance and manufacturing including assembly, testing, startup, troubleshooting, repair and upgrades of machinery and associated control systems.

Industry-Sector Technical Competencies

PLC

- Motor Controls – Understand industrial motor control principles including installation, maintenance, and repair principles
- PLC systems - Understand the functions and components of PLC systems in order to achieve desired outcomes.
- Hydraulic systems - Understand how hydraulic systems function and their applications and integration with PLCs.
- Drivers - Understand the components and applications of drivers in order to achieve desired outcomes.
- Schematics – Knowledge in properly reading schematics.
- Troubleshooting – Understanding to troubleshoot PLC programs.

Mechanical

- Basic machining - Understand how to safely operate machinery and the theory behind machining functions.
- Hand tools – Understand when and how to safely use hand tools in machining processes.
- Fluid power (Hydraulics/Pneumatics) – Knowledge in operating, adjusting, servicing and installing fluid power systems.
- Power transmission – Training in the function of power transmission and how to install, maintain and repair.
- Blueprint reading - Instruction in interpreting blueprints and using them to manufacture machines and parts.
- Troubleshooting - Training in use of tools and knowledge to repair machines and correct manufacturing issues.

Electrical

- Electrical and electronic systems - Training to safely operate, repair, and understand electrical and electronic systems.
- Motor controls - Understand industrial motor control principles including installation, maintenance, and repair principles.
- Electrical control circuits - Learn how to safely operate and modify electrical control circuits.
- “Outlet to Machines” – Understand the theory of the electrical processes that happen from the electrical outlet to the machine.
- Blueprint reading - Instruction in interpreting blueprints and using them to build and repair machinery and electronic components.
- Schematics - Instruction in reading schematics and using them to build and repair machinery and electronic components.
- Troubleshooting - Training in use of tools and knowledge to repair electronics and machines.

Occupation-Specific Competencies

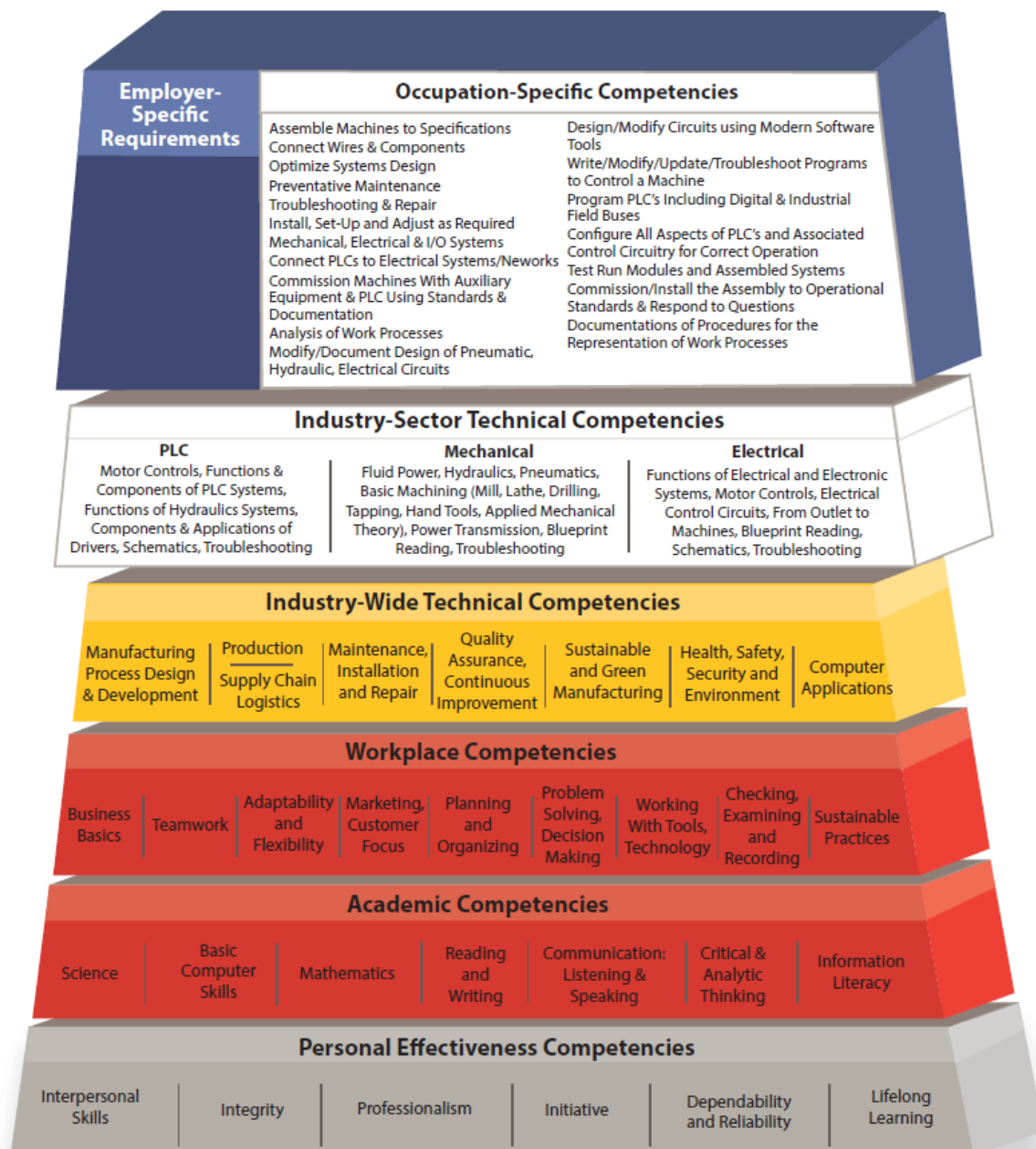
- Assemble machines - Ability to assemble machines given the proper tools, parts, and manuals. Connect wires and components for proper functionality.
- Install, set-up and adjust – Install, set-up and adjust mechanical, electrical and I/O systems.
- Optimize system design - Elevate system design so as to increase the efficiency of the machines/electronics and to decrease the cost of operation.
- Preventative maintenance - Perform maintenance on machines and electronics to avoid potential technological breakdowns.
- Troubleshooting and repair – Able to troubleshooting issues and perform repair work.
- PLCs and electrical systems/networks – Comprehension of how PLCs and electrical systems/networks work together and ability to connect them together.
- Commission machines – Commission machines with auxiliary equipment and PLCs using standards and documentation.
- Write/modify/update/troubleshoot programs – Create programs and execute necessary maintenance and troubleshooting procedures for programs operating machines and electronics.
- Design and modify – Ability to design and modify pneumatic, hydraulic and electrical circuits using modern software tools when appropriate.
- Analysis of work process - Be able to evaluate and optimize work processes.
- Programming PLCs – Demonstrate PLC programming including digital and industrial field buses.
- Configure PLCs – Configure all aspects of PLCs and associated control circuitry for correct machinery operation.
- Testing – Perform test runs of modules and assembled systems.

- Commission and install – Commission and install the assembly to operational standards and respond to questions regarding machinery.
- Documentation – Document procedures which represent work processes.

PIPELINE Project

Competency Model for Advanced Manufacturing Occupation: Mechatronics

Possible Associated Credentials: Associates Degree, PMMI, IPC, AWS, NIMS, MSSC



Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

Mechatronics Occupational Competency Training Plan

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	Course	Course Description	Credit/Non-Credit	Hours Spent on Competency
PLCs: <ul style="list-style-type: none"> • Motor Controls • PLS Systems • Hydraulic Systems • Drivers • Schematics 				
Mechanical: <ul style="list-style-type: none"> • Basic Machining • Hand Tools • Fluid Power • Power Transmission • Blueprint Reading • Troubleshooting 				
Electrical: <ul style="list-style-type: none"> • Electrical and Electronic Systems • Motor Controls • Electrical Control Circuits • “Outlet to Machines” • Blueprint Reading • Schematics • Troubleshooting 				

On-The-Job Training is the work experience and instruction. Training experience need not be in the exact order as listed below.

	Trainer/Instructor	Name of person responsible for verifying competency mastery	Hours spent on competency
Assemble machines			
Optimize system design			
Troubleshooting and Repair			
PLCs and electrical systems/networks			
Commission Machines			
Write/modify/update/troubleshoot programs			
Design and Modify			

Analysis of work process			
Programming PLCs			
Configure PLCs			
Testing			
Commission and Install			
Documentation			

MINNESOTA PIPELINE PROJECT

PRIVATE INVESTMENT, PUBLIC EDUCATION

LABOR AND INDUSTRY EXPERIENCE

Quality Assurance/Food Safety Supervisor – This position is responsible for the proper, productive and safe fitting and joining of metal and various components/parts together with select welding processes and procedures within a manufacturing environment.

Industry-Sector Technical Competencies

- Food Safety - Understand theory and implementation practices of HACCP.
- Food Sanitation – Knowledge of sanitation procedures from contamination in all functions and operations of a facility
- Food Processing Microbiology– Understand the theory of microbiology related to the food processing environment.
- Training/Adult Learning - Understand how to effectively train and present material to adult learners.
- Documentation – Understand theory and principals of documentation and document control procedures.
- Critical Thinking Theories – Understand theory and principals of key critical thinking theories, such as Root Cause Analysis, and Gap Analysis.
- Food Security/Bio Security - Awareness of processes for prevention and preparedness to maximize food security against tampering, whether natural, inadvertent or intentional.
- Food Science/R & D – Understanding of food science principles and provide technical support for research and development.
- Quality Management – Understand and implement GMPPS's per BRC CFR 21 and Foreign Material Control.
- Root Cause Analysis – Knowledge of this method of problem solving used for identifying the root causes of faults or problems.
- Management Principles – Understand management theories related to management, leadership and team building.
- Food Law – Knowledge of laws surrounding food production and oversee the production facility to ensure compliance.

On-The-Job Training Competencies

- HACCP Review/Monitoring – Demonstrate understanding of Hazard Analysis Critical Control Point (HACCP) management system and ability to review associated company production practices to ensure conformance.
- Audit Manufacturing Practices/ Facility Sanitation – Ability to conduct audits on manufacturing practices and facility sanitation procedures.

- Maintain Quality Management System – Oversee data and policies related the quality management.
- Maintain Facility Cleaning Programs – Oversee all aspects of the production facility's cleaning programs.
- Maintain Food Defense Plan – review and revise Food Defense Plan based on a plants changing conditions or process changes.
- Coordinate Food Safety and Quality Training – Responsible for coordinating and, at times, conducting safety and quality training for facility employees.
- Manage Customer Complaints – As needed, field customer complaints and address quality issues.
- Investigate Quality Issues – Conduct investigations into product quality issues and manage resolution actions.
- Traceability – Ability to verify the history, location and application of components of the manufacturing process, as well as products.
- Understand Processing, Lab Equipment and Product – Demonstrate understanding of facility processing and lab equipment, as well as final products.

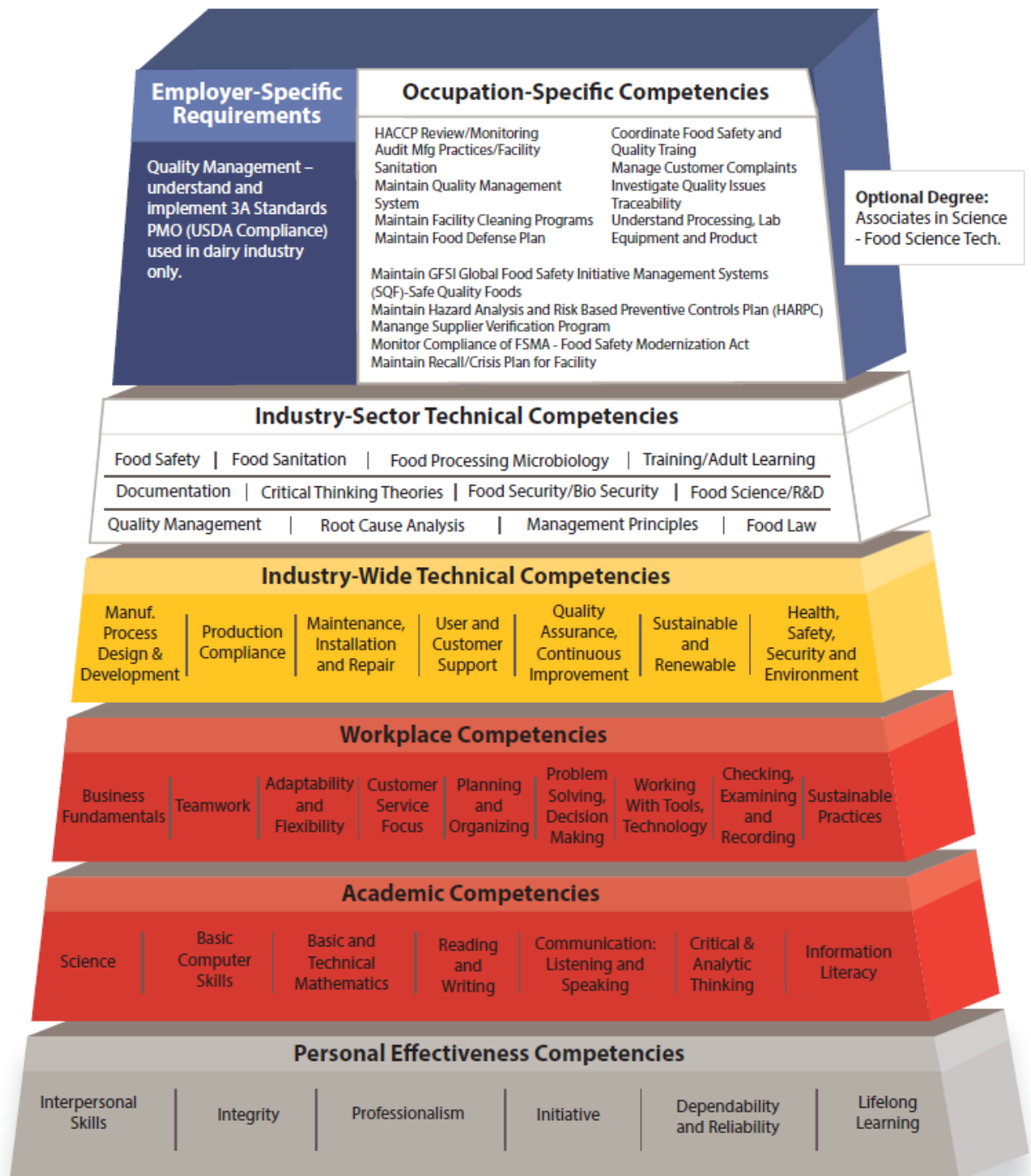
Employer-Specific Requirements:

Quality Management – understand and implement 3A Standards P.M.O. (USDA Compliance) used in dairy industry only.

Minnesota Apprenticeship Initiative

Competency Model for Advanced Manufacturing

Occupation: Quality Assurance/Food Safety Supervisor



Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

Quality Assurance/Food Safety Supervisor Occupational Competency Training Plan

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	Course	Course Description	Credit/Non-Credit	Hours Spent on Competency
Food Safety				
Food Sanitation				
Food Processing Microbiology				
Training/Adult Learning				
Documentation				
Critical Thinking Theories				
Food Security/Bio Security				
Food Science/R & D				
Quality Management				
Root Cause Analysis				
Management Principles				
Food Law				

On-The-Job Training is the work experience and instruction. Training experience need not be in the exact order as listed below.

	Trainer/Instructor	Name of person responsible for verifying competency mastery	Hours spent on competency
HACCP Review/Monitoring			
Audit Manufacturing Practices/ Facility Sanitation			
Maintain Quality Management System			
Maintain Facility Cleaning Programs			

Maintain Food Defense Plan			
Coordinate Food Safety and Quality Training			
Manage Customer Complaints			
Investigate Quality Issues			
Traceability			
Understand Processing, Lab Equipment and Product			

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LABOR AND INDUSTRY EXPERIENCE

Welder – This position is responsible for the proper, productive and safe fitting and joining of metal and various components/parts together with select welding processes and procedures within a manufacturing environment.

Industry-Sector Technical Competencies

- Blueprint Reading/Welding Symbols – Develop the skills necessary to interpret working drawings common to the metalworking field. Focus on orthographic projection drawings and interpreting specified welding information and symbols.
- Welding Math and Measuring – Knowledge to apply basic math skills, make accurate measurements and use measuring tools in regards to various aspects of the welding process.
- Material Inventory Control – Training in how to manage stock materials as well as track and purchase necessary items in order to seamlessly support the overall manufacturing process.
- Machine Maintenance – Know how to complete appropriate and thorough maintenance procedures to keep welding machines running safely and dependably
- Geometric Dimensioning and Tolerancing – Knowledge of the symbolic way that specific tolerances on blueprint drawings are referenced and how this impacts the manufactured part.
- Basic Fabrication – Understanding of metal fabrication by cutting, altering and shaping steel or other materials through the use of different tools, techniques and processes prior to welding.

Occupation-Specific Competencies

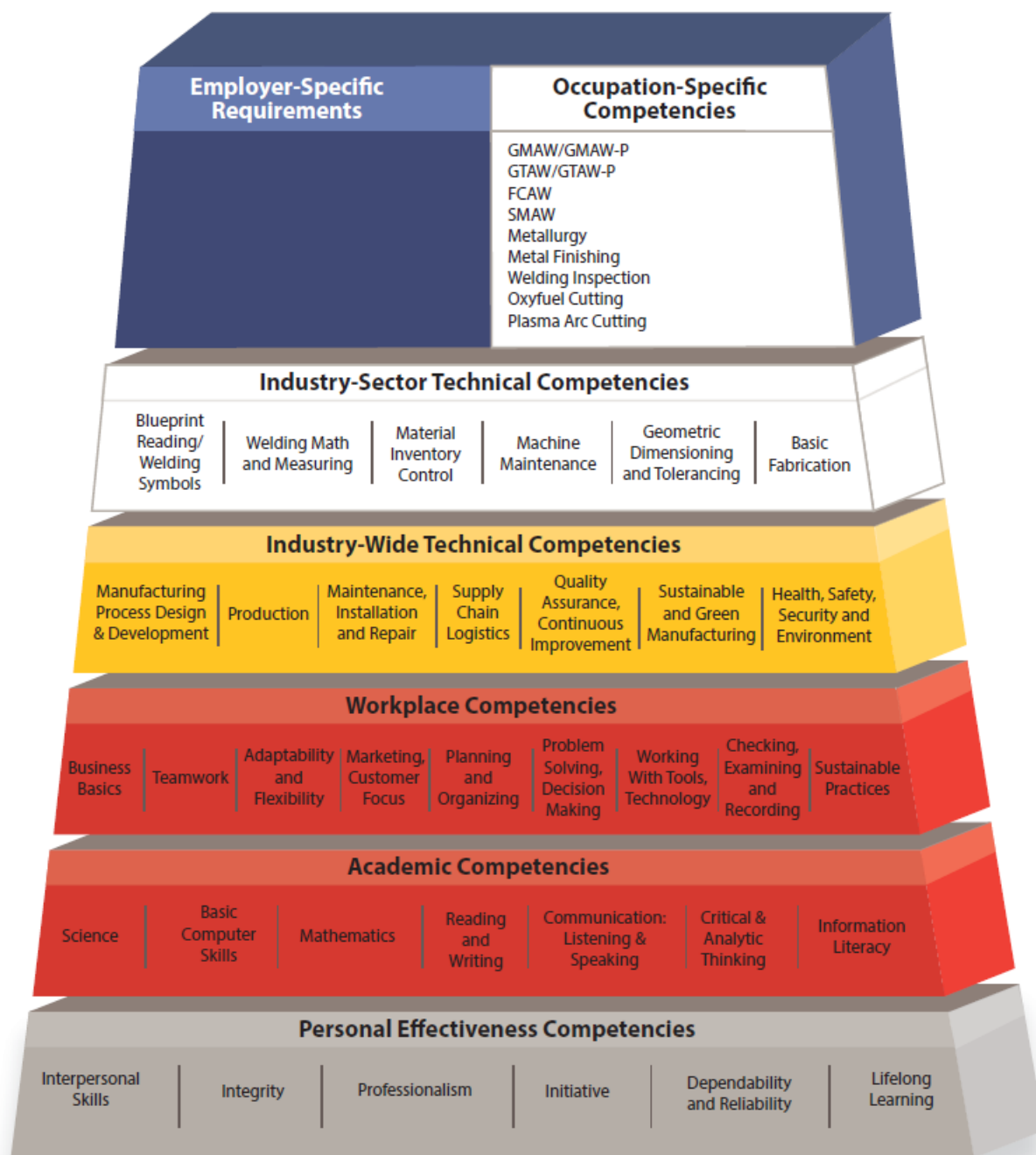
- Metallurgy – Ability to select the appropriate welding process for a particular application, choose or adjust welding parameters and techniques to optimize weldment properties and know the cause of and avoid weld defects.
- Metal Finishing – Able to refine welds without compromising the integrity of the part and welded joint.
- Welding Inspection – Demonstrate how to identify weld defects, confirm product is up to customer welding standards, and use appropriate tools to accomplish weld inspections.
- Oxyfuel Cutting – Aptitude to produce good quality cuts on a variety materials using the correct procedures. Practice safe working procedures for handling the equipment and cylinders in the Oxyfuel process.

- Plasma Arc Cutting - Aptitude to produce good quality cuts on a variety materials using the correct procedures. Practice safe working procedures for handling the equipment and cylinders in the Plasma Arc process.
- GMAW/GMAW-P – Demonstrate welding using gas metal arc welding or pulsed gas metal arc welding (GMAW-P) safely and correctly.
- GTAW/GTAW-P - Demonstrate welding using gas Tungsten arc welding or pulsed gas Tungsten arc welding (GTAW-P) safely and correctly.
- FCAW - Demonstrate welding using flux cored arc welding (FCAW) safely and correctly.
- SMAW - Demonstrate welding using shielded metal arc welding (SMAW) safely and correctly.

Specific welding skills required will depend on employer's needs.

PIPELINE Project

Competency Model for Advanced Manufacturing Occupation: Welder



Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

Welder Occupational Competency Training Plan

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	Course	Course Description	Credit/Non-Credit	Hours Spent on Competency
Blueprint Reading/Welding Symbols				
Welding Math and Measurement				
Material Inventory Control				
Machine Maintenance				
Geometric Dimensioning and Tolerancing				
Basic Fabrication				

On-The-Job Training is the work experience and instruction. Training experience need not be in the exact order as listed below.

	Trainer/Instructor	Name of person responsible for verifying competency mastery	Hours spent on competency
Metallurgy			
Metal Finishing			
Welding Inspection			
Oxyfuel Cutting			
Plasma Arc Cutting			
GMAW/GMAW-P			
GTAW/GTAW-P			
FCAW			
SMAW			

